

The Statistical Analysis and Application of Multimedia Elements in Power Point Courseware

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Abstract

As the presentation software with abundant functions, PowerPoint, which is easy to use, has been used in class teaching widely. PowerPoint courseware contests in many places have high requirements for the quality and skills, but the entries are on various levels and the amount is huge, making it consume a lot of time and energy during the evaluation process. The author designs and develops a PowerPoint courseware multimedia elements statistical system, which can make statistical analysis for the main multimedia elements of PowerPoint courseware in batch. The statistic result will reflect objectively the general structure of PowerPoint courseware used in multimedia elements, which contributes to reducing the workload of experts.

Key Words

PowerPoint Courseware; Multimedia Elements; Statistical Analysis

Introduction

As an excellent multimedia elements integration tool, PowerPoint can insert text, graphics, sound, animation, video and other multimedia elements. It can clearly present the teaching contents, which cannot be expressed by blackboard or projector, making the abstract contents more vivid. Since PowerPoint can create a clear, intuitive, systematic and also lively teaching environment, it is popular in school and loved by majorities of teachers. However, there are a series of problems in the design and developing process, such as miscellaneous texts and words, unreasonable layout, disorderly style and discordant color collocation, etc. Education and teaching institutions at all levels often carry out various forms of multimedia courseware competition in order to promote teachers' ability of developing PowerPoint courseware, among which PowerPoint courseware has an important position. Because of the various levels of the entries and the huge amount, the experts have to screen and evaluate a large number of PowerPoint coursewares.

The assessment of the quality of PowerPoint courseware should be according to certain design principles, on which many experts and teachers have done the related research. P.J.Wang (2009) held the opinion that the layout of PowerPoint courseware should follow the principle of consistent, which means strengthening the consistency of the layout and making all kinds of the layout elements consistent on structure and color^[1]. B.Yang(2009) thought that we should fully consider the symbolic meaning of colors and the internal coordination of subject information^[2]. Z.X.Zhong(2011) maintained that learners should be considered as the center during the PowerPoint design process and that the students' cognitive and emotional characteristics ought to be fully considered; he also pointed out that we should refine the content and presentation, but not simply repeat the content of the textbook^[3]. The design principles of these studies provided references for the PowerPoint courseware evaluation to some extent, but they are too subjective, because they are the suggestions based on some related experience in teaching and learning theories. The practical application of these principles in PowerPoint evaluation is still very difficult and time consuming. However, there is also related research that gives the more specific advice. For instance, M.Yan (2007) suggested that there should be no more than 3 or 4 colors in one page, including the background color and text color^[4]. According to this principle, it would be inappropriate when there are more than 4 colors in one page, and then such PowerPoint courseware will be screened out. This specific design principle is

advantageous to the systematic and automatic evaluation of PowerPoint courseware. Based on this purpose, the paper outlines a set of indexes which contributes to the statistical analysis and screening of PowerPoint courseware and develops the prototype of PowerPoint courseware analytic system.

Multimedia Elements of PowerPoint Courseware

PowerPoint courseware should be evaluated from multiple perspectives, including teaching design, content presentation, technology application and innovation etc. But a high-quality PowerPoint courseware features good educational, systematic, and inspiring effect under the premise of basic scientific principle and normalization. Without normative and reasonable presentation form, PowerPoint courseware could not present its advantages in content design no matter how excellent it is. The paper starts with the most basic requirement of PowerPoint—normalization, to put forward a set of evaluation indexes which are operable for computer system, finally contributing to the further screening.

A high-quality PowerPoint courseware should be the result of the reasonable collection of a variety of multimedia elements, with different multimedia elements playing different role in presenting teaching content and creating teaching atmosphere.

Words

Words are used as the main form to present the PowerPoint courseware teaching content, to highlight the difficult and important knowledge and to help teachers to organize clearly the thoughts and contexts of teaching content. Words contribute to making the structure more bright, the difficult and important knowledge more prominent and keeping the order of teaching strategies. PowerPoint courseware with text information beyond the cognitive load of students will make the teaching effect poor.

Images

When words cannot illustrate the issues well, images can always have unexpected effect, proving intuitive and perceptual materials. Take "fish cattle" in the constructivism theory as an example--the fish has an image of cattle in its mind after listening to the frog talking about the appearance of cattle: a big fish body, two horns on the head, the mouth eating grass... Such thinking error can be avoided if we make the appearance of cattle in the picture. Images can express the content more clearly, which helps to deepen the impression and enhance the memory of the teaching content.

Charts

Usually used in teaching, charts play the role of comparative analysis. Especially when the data quantity is huge, a simple chart can show the implicit internal relations. Sometimes when teachers want to demonstrate the change law of something or a project, a curve or broken line can do it well. Chart analysis makes understanding and communication much easier and more likely to accept for the learners.

Audio/Video

Audio and video are of great persuasiveness. By making use of animations, music, colors and movements, teachers can help students learn more naturally and comfortably. These methods conform to the way that people listens or observes in their daily life, so students accept and learn the contents in the PowerPoint courseware unconsciously.

While preparing PowerPoint, teachers should choose various elements according to the characteristics of different multimedia elements and the PowerPoint courseware should be well-structured with points highlighted. Psychological studies shows that people can memorize about 15% information acquired by hearing, 25% by vision and 65% through listening and watching at the same time^[5]. Therefore, to make use of PowerPoint as a media tool more effectively, teachers should upgrade its quality by arranging the different multimedia elements properly so as to provide students more vivid and direct audio-visual experiences. The differences and importance of multimedia elements make it a crucial standard in multimedia courseware competition. It has

constructive meaning to the evaluation of PowerPoint in multimedia courseware competition to form a quantitative index system and a corresponding statistical system which can rank the PowerPoint courseware and screen unqualified ones.

Basic Statistic Indexes Proposed

According to related researches at home and abroad, strong subjectivity and scarce quantitative research are their main characters. There still don't have a scientific and systematic assessment system about the research of PowerPoint courseware; neither do we have a set of feasible and reasonable standard. In China, people tend to assess in a subjective way. For example, D.H.Zhang thought "In order to optimize the teaching in class and help students master what they have learned, teachers should design the teaching materials first and then classify them. Teachers should combine the teaching goals, materials and methods with the designing of courseware. Texts, voices, animations and graphs can help teachers better illustrate the teaching materials and this kind of teaching can present the teaching goals and knowledge in an appropriate way."^[6] D.H.Zhang put forward his suggestions for the designing principles but did not make a further explanation of what he had said above. Subjective assessment lacks of definite guidance in the designing of PowerPoint courseware and only shows whether the designing conforms to the teaching subject. Therefore, it's not convenient in mass screening and will not reduce the burdens of experts evaluating the PowerPoint courseware.

The following table is the systematic and specific analysis indexes combined the operation feasibility and basic normalization of evaluation index.

TABLE1 SPECIFIC ANALYSIS INDEXES

First grade index	Second grade index	Computational formula	Definition of index
Text (50)	Text_size (10)	Slides: Text_size \geq 20	Text size should be at least 20
	Line_height (10)	Slides: Line_height \geq 1.25	Line height should be at least 1.25 times
	Text_color (10)	Slide: Text_color \leq 4	There are at most 4 kinds of colors in one page.
	Text_line (10)	Slide: Text_line \leq 8	There are at most 8 text lines in one page.
	Text_style (10)	Slide: Text_style \leq 4	There are at most 4 kinds of text style in one page.
Picture (10)	Pic_size (10)	Slide: Pic_size \geq 1/9slide_size	The picture size is at least 1/9 of the slide size.
Chart (20)	Chart_size (10)	Slide: Chart_size \geq 1/9slide_size	The chart size is at least 1/9 of the slide size.
	Chart_num (10)	Slide: Chart_num \leq 2	There are at most 2 charts in one page.
Video (10)	Video_time (10分)	Slides: Video_time \leq 3min	The video time should at most 3 minutes.
Page (10)	Page_Num (10)	Slides: Page_Num \geq 20	The page number should be no more than 20 pages.

From Table 1, all specific analysis indexes are reference to the basic norms of PowerPoint and provide a basic reasonable quantitative value. The quantitative values of the system are statistically analyzed, in order to check whether the basic multimedia elements of the PowerPoint courseware meet the criteria in the table and achieve the aim of screening. The following are the detailed explanation for the table:

- 1)The index in the table is only a part of the basic norms that PowerPoint courseware should meet and can't represent all norms.
- 2)The quantitative values are basically reasonable. These values refer to a large number of relevant literature and existing PowerPoint courseware evaluation criteria, and practical values can be adjusted according to different circumstances.
- 3)Slides represent the entire PowerPoint courseware, while Slide represents a single slide page.

4)The value of index stands for score, 10 points per item, the sum of the 10 indexes is 100 points. The score can only show the basic situation on normalization of PowerPoint courseware to a certain extent, but cannot reflect the content, logic and creativity.

5)The name of the index is its name in the statistical system.

This table provides the thought and basis for the design and development of the system. The author makes a preliminary exploration of the system and implements the last part of the function of the table.

Statistical Analysis System Prototype and Application of PowerPoint Courseware Elements

Prototype System Description

The author has designed and developed the prototype system using Java language by the help of Eclipse. The previous studies about the standardization of PowerPoint courseware are mostly on the basis of referring to Microsoft PowerPoint Visual Basic, which needs to establish an entity model and then do the related research. This paper makes use of the structure of Apache POI HSSF under open source library (provide the function of reading and writing Micosoft Excel format file) and HSLF (provide the function of reading and writing Micosoft PowerPoint format file), making the system conveniently quickly call the related codes and omitting the process of abstracting PowerPoint courseware model. The system has implemented the functions of counting in batch the numbers of pages, autoshape, pictures, sound files and words, writing clearly the results into Excel.

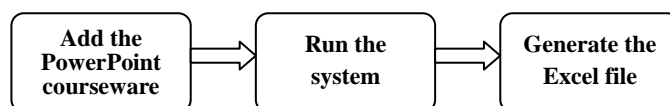


FIG.1 SYSTEM FLOW CHART

Firstly, put the PowerPoint courseware in the system specified file, which has fixed path for the file storage. The system only supports “.ppt” PowerPoint files, so only this type of files in the system can be read; other types of files cannot be read, such as “.pptx”. There is no limit with the number of PowerPoint courseware, but the output will be ordered according to the system specified file by fault.

Then operate the system and carry on the analysis statistics. The output will be stored in a file named “PPT analysis result.xls” generated by system, which will also be stored in the system specified folder. Open the file, as seen in FIG.2, we can see clearly the first row of the file: PPTName, pageNum, PageNumwithshape, pictureNum, soundNum and wordNum are the corresponding properties of file name, pages number, autoshapes number, pictures number, sound files number and words number of PowerPoint courseware. After conformance testing, each attribute value corresponds accurately to the PowerPoint courseware files, showing that the system can operate normally.

	A	B	C	D	E	F
	PPTName	pageNum	PageNumwithshape	pictureNum	soundNum	wordNum
1	PPTName					
2	第1章 创建服务器环境.ppt	191	164	64	2	42284
3	第2章 ASP基础-HTML 练习.ppt	28	28	8	0	13629
4	第2章 ASP基础-浏览器端脚本技术Javascript.pp	40	40	15	0	35255
5	第2章 ASP基础.ppt	25	25	5	1	3281
6	第3章 使用VBScript进行动态网页设计.ppt	75	72	14	0	11794
7	第4章 Request和Response对象.ppt	45	45	19	0	10257
8	第5章 Application和Session对象.ppt	28	28	2	0	4299
9	第6章 Server对象.ppt	17	17	1	0	2543
10	第7章 使用ASP操纵数据库.ppt	73	73	1	0	21915
11	第8章 ASP的常用组件.ppt	18	18	3	0	2095
12	第9章 论坛的实现.ppt	21	21	7	0	1647
13						
14						
15						
16						
17						
18						
19						
20						
21						

FIG.2 “PPT ANALYSIS RESULT.XLS” FILE

The Analysis of Application Results

It can be seen from the Excel that PowerPoint courseware and each attribute value have formed a two-dimensional table, making it more clear and convenient to analyze the corresponding properties of the PowerPoint courseware. Take the first row as an example: it represents the corresponding properties of PowerPoint courseware named "the first chapter, creating server environment", of which the page number is 191, the number of autoshape is 164, the number of pictures is 64, the number of sound files is 2 and the total number of words is 42284.

It can be seen from the analysis result that the corresponding properties of PowerPoint courseware are the specific value of the corresponding multimedia elements. Index of page number: the page number is at least 20. Setting Page Num \geq 20 by the function of Excel, we will get the result as shown in FIG.3:

	PPTName	PageNum	PictureNum	SoundNum	WordNum
1	第1章 创建服务器环境.ppt	191	164	64	42284
2	第2章 ASP基础-HTML练习.ppt	28	40	8	13629
3	第2章 ASP基础-浏览器脚本技术Javascript.pp	40	15	0	35255
4	第2章 ASP基础.ppt	25	25	5	3261
5	第3章 使用VBScript进行动态网页设计.ppt	75	72	14	11794
6	第4章 Request和Response对象.ppt	45	45	19	10257
7	第5章 Application和Session对象.ppt	28	28	2	4299
8	第7章 使用ASP模拟数据库.ppt	73	73	1	21915
9	第9章 论坛的实现.ppt	21	21	7	1647
10					
11					
12					

FIG. 3 THE SCREENING RESULT OF SETTING PAGENUM \geq 20

From the results of the analysis, we can see clearly the courseware that do not meet the conditions—"chapter 6 Server Object" and "Chapter 8 ASP Common Components" have been rejected, achieving the aim of screening.

The advantages of writing the analysis result into an Excel file are not only those shown above. If the table is not intuitive enough, we can use other abundant functions of Excel to manipulate the data, such as writing the result into more intuitive tables, generating bar charts or pie charts and so on.

Illustration of Some Core Algorithms

1) Put All the Properties in PowerPoint Courseware into Excel Row.

```
public void writer(Map<String, String> item) {
    rownum++; int j = 0;
    HSSFRow row = sheet.createRow(rownum);
    if(item.get(PowerPointConstant.PowerPointName) != null){
        row.createCell(j++).setCellValue(item.get(PowerPointConstant.PowerPointName));
    }else
        row.createCell(j++).setCellValue("");
    if (item.get(PowerPointConstant.pageNum) != null){
        row.createCell(j++).setCellValue(Integer.parseInt(item.get(PowerPointConstant.pageNum)));
    }else
        row.createCell(j++).setCellValue(0);
    if(item.get(PowerPointConstant.PageNumwithshape) != null){
        String price =
            item.get(PowerPointConstant.PageNumwithshape);
        double num;
        num=Double.parseDouble(price);
        row.createCell(j++).setCellValue(num);
    }else
```

```

        row.createCell(j++).setCellValue(0);
    if (item.get(PowerPointConstant.pictureNum) != null){
        String price =
            item.get(PowerPointConstant.pictureNum);
        double num;
        num=Double.parseDouble(price);
        row.createCell(j++).setCellValue(num);
    }else
        row.createCell(j++).setCellValue(0);
    if (item.get(PowerPointConstant.soundNum) != null){
        String snum =
            item.get(PowerPointConstant.soundNum);
        int num;
        num=Integer.parseInt(snum);
        row.createCell(j++).setCellValue(num);
    }else
        row.createCell(j++).setCellValue(0);
    if (item.get(PowerPointConstant.wordNum) != null){
        String word =      item.get(PowerPointConstant.wordNum);
        double num;
        num=Double.parseDouble(word);
        row.createCell(j++).setCellValue(num);
    }else
        row.createCell(j++).setCellValue(0);
}

```

2)Count the number of words in the PowerPoint courseware.

```

StringBuffer content = new StringBuffer();
for(int i=0;i<slide.length;i++){
    TextRun[] t = slide[i].getTextRuns();
    for(int j=0;j<t.length;j++){
        content.append(t[j].getText());
    }
}
map.put(PowerPointConstant.wordNum, Integer.toString(content.length()));

```

Conclusion

The writer attempts to do some preliminary exploration in PowerPoint courseware evaluation of standardization work and carry out the prototype of the system. The batch of statistics filter allows multimedia contest evaluation process easier, greatly reduce the workload of evaluation, and can provide some quantitative basis. In addition, it reflects some common problems of PowerPoint courseware, in particular the problems among some novice teachers, while these issues in the PowerPoint courseware developing process are often very easy to ignore, such as courseware manifestations of a single, fundamental elements in unreasonable and so on.

Multimedia elements analysis based on PowerPoint courseware benefits to educational resource and evaluation optimization, meeting the requirements of contemporary intelligent learning to develop educational resources. The system prototype only can make quantity statistic for pages, text, images and other multimedia elements, has not been completed with the size of the text, style, and other indexes such as the size of the picture of statistical functions, remains to be perfected. But with the development and improvement of the system, each limitation issue will be resolved. It would be a comprehensive system integrated with more functions, having reasons to believe that it will provide more detailed guidance and make the PowerPoint courseware to better service for teachers and

students. This study attempts to objectively analyze the factors influencing the effect of teaching in developing PowerPoint courseware. Slide show time, combined with Blackboard, teaching body language and preparations are significant factors in teaching. Good PowerPoint coursewares require good teaching to its full function.

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